ARGONNE
NATIONAL LABORATORY

Shaping the Energy Future

Nuclear Energy R&D

Argonne's roots lie in nuclear energy R&D. Argonne-led research supports every main nuclear power system throughout the world. One of our most notable successes has been the development and transfer of the technologies in today's commercial nuclear reactors.

Today, we continue our work in support of current-generation reactor technology while conducting research and development aimed at closing the nuclear fuel cycle and enabling the production of the clean sustainable energy that will be needed for the future.

Argonne's scientific and technical diversity provides the full range of capabilities needed to meet this challenge. Working in diverse, multidisciplinary teams, we are using cutting-edge research and modeling/simulation tools to translate fundamental scientific understanding into innovative technologies.

Chemical Engineering Division

Chemical engineers move pyroprocessing equipment remotely in an engineering-scale electrorefiner.

We are a technically diverse applied research organization specializing in the treatment and disposal of spent nuclear fuel and radioactive wastes, electrochemical power systems, and catalyst development.

Our researchers are leading the development of technologies to close the nuclear fuel cycle, concentrating on spent fuel separations and Yucca Mountain repository source term performance.

- We are exploring chemistries, developing technologies, modeling and designing equipment and process flowsheets, and conducting demonstrations of:
  - The UREX+ suite of solvent extraction processes for treating commercial light water reactor fuel.
  - Pyrochemical processes for the treatment of advanced reactor fuels.
- We are conducting degradation testing and modeling of spent fuel and high-level-waste glass, and carrying out studies designed to understand the mechanisms of radionuclide release from source term degradation in environments expected in the repository.

Our work is funded primarily by the U.S. Department of Energy, but we also do work for and with other government agencies, universities, and industrial firms. In the course of our work we generate valuable intellectual property that is available for licensing.

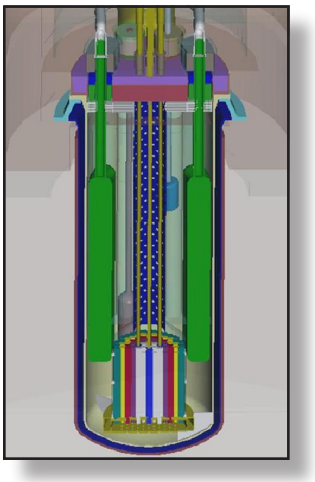
A chemical engineer examines a sample of solvent from an experiment using a centrifugal contactor that is being tested for processing spent nuclear fuel as part of the Advanced Fuel Cycle Initiative.

Nuclear Engineering Division

We are advancing the design and operation of nuclear energy systems and applying our nuclear-energy-related expertise to current and emerging programs related to advanced reactor systems and national security and non-proliferation.

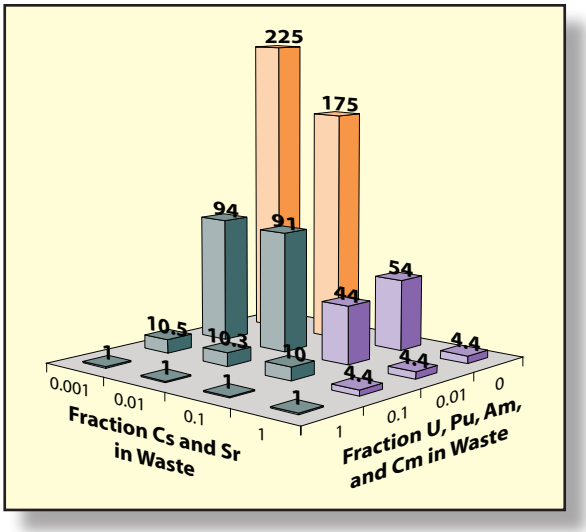
We are involved in several programs of national and international importance, including

- Generation IV (Gen IV) nuclear system design, including advanced fast reactor systems for actinide management,
- Fuel cycle and repository performance modeling that can be used to evaluate alternative fuel cycle technologies,



Concept diagram for a sodium-cooled advanced "burner" reactor.

- Research related to the operational safety of commercial light water reactors (LWRs) for the U.S. Nuclear Regulatory Commission (NRC),
- Reduced Enrichment for Research and Test Reactors (RERTR) design and safety analyses, and
- National security and non-proliferation programs to support materials safeguards and export controls in Russia, the Newly Independent States (NIS), and elsewhere throughout the world.



Potential repository drift loading increase as a function of separation efficiency for commercial spent nuclear fuel.

Our personnel contribute to improving the operation of existing nuclear energy systems and to resolving issues related to their performance and safety. We have a key role in advancing major Argonne initiatives in such diverse areas as transportation, hydrogen generation and computational science. We also contribute engineering expertise to the design, operation and decommissioning of major facilities at Argonne and elsewhere.

About Argonne . . .

- Owned by U.S. Department of Energy (DOE), operated by The University of Chicago.
- Located on 1,500 wooded acres near Chicago.
- Employs 2,900 people from 71 countries.
- Annual operating budget $475 million.
- Scientifically and technically diverse.
- Partners with DOE and its laboratories, other federal agencies, state and local governments, universities, and private organizations.
- Dedicated to being an employer of choice.
- Offers year-round undergraduate and graduate educational opportunities.

For more information, go to http://students.ne.anl.gov

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